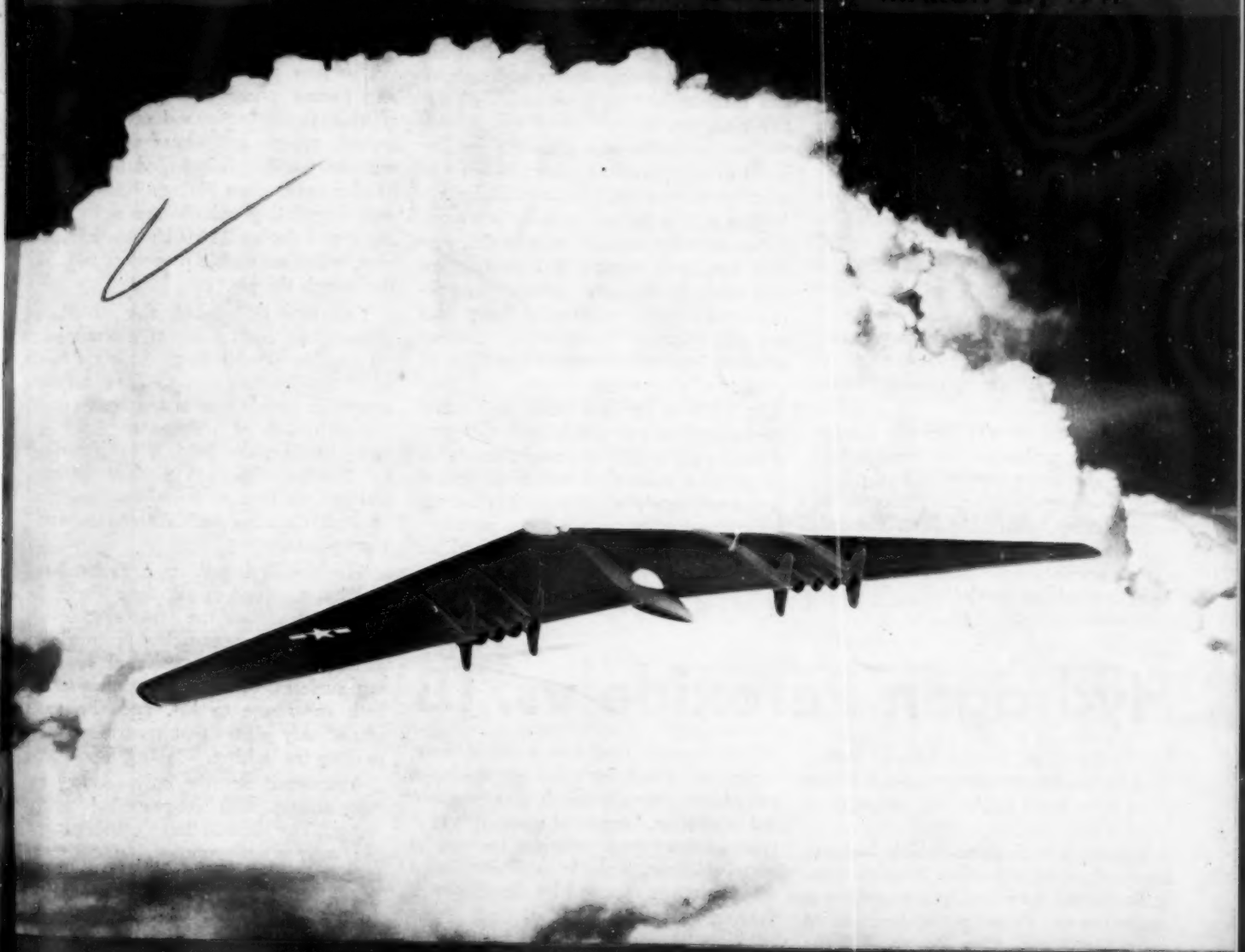
15¢

SCIENCE NEWS LETTER

PUBLIC LIBRARY
APR 4 - 1947
DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 29, 1947



Flying-Wing

See Page 194

A SCIENCE SERVICE PUBLICATION

PHYSICS

Atomic Age Bright Lights

Fissionable materials will be scarce for domestic use such as in ceramics or photography, but will continue to be available for electric light bulbs.

➤ SOME OF the atomic bomb's fissionable ingredients which you have around the house may become rarities, but your light bulbs will shine just as brightly.

These are some of the facts of life in an atomic age. Yellowish-green, fluorescent glass, getting its unique qualities from uranium, cannot be manufactured in the United States after April 1, under regulations laid down by the U. S. Atomic Energy Commission.

Pottery plates, cups and vases with a certain striking red color and a sort of yellowish tinge are out, too. The color came from uranium, and some of these pieces, which were very common before the war, may become collector's items.

Light bulbs, however, will continue to use thorium, which scientists have found can be used with uranium in an atomic bomb. The well-known tungsten filament of light bulbs contains one to one and one-half percent thorium to increase the light.

Rules issued by the Atomic Energy Commission prohibit use of uranium in ceramic or glass products and in photographic work, unless under "exceptional circumstances," after April 1. Ceramic and glass products with uranium are already scarce because the use of uranium was curtailed during the war.

In photography, uranium is used in toning baths, but other satisfactory chemicals are available and more frequently used. Uranium compounds for photographic use have not been sold for several years due to wartime restrictions.

Under the commission's regulations, which become effective April 1, licenses will be required for all materials with one-twentieth of one percent of uranium and thorium or any combination of the two elements.

Glass, ceramics and photography are listed as exceptions to this rule, but another provision says there will be no further supply for use in those products.

Incandescent mantles, refractories, certain rare-earth metals and compounds and vacuum tubes are exempt from licenses as is any transfer or delivery during one calendar month of uranium or thorium ores which contain less than 10 pounds of the metals.

In addition to light bulbs and many specialized tubes which use thorium, crucibles using thorium oxide, employed in melting such elements as platinum, and compounds of rare-earth elements which naturally contain some uranium or thorium will be permitted without any license.

Science News Letter, March 29, 1947

MEDICINE

Hydrogen Peroxide vs. TB

➤ HYDROGEN PEROXIDE, the household first aid treatment for cuts a generation ago, may help the fight against tuberculosis.

Tuberculous abscesses which had not been helped by any other form of treatment cleared up when this remedy was applied in wet dressings two to six times daily, Dr. Ethan Allan Brown of Tufts Medical School and Dr. L. W. Slanetz of the University of New Hampshire report in *Science* (March 21).

The treatment was given over a period of four to eleven months. To make sure the improvement was not temporary, the doctors delayed reporting the results until a year after the abscesses had healed.

The peroxide used was a special form made by dissolving urea peroxide in anhydrous glycerol, which gives a more stable solution. Successful use of this new type of antiseptic solution in middle ear infections, mouth infections and empyema was reported by Dr. Brown a year ago.

When laboratory tests showed it could kill tuberculosis germs, Dr. Brown decided to test its possibilities as a remedy in human patients. These trials were made with Dr. Joseph Goldberg on four patients at the Essex County Tuberculosis Sanatorium at Danvers, Mass.

The patients had the extremely chronic, smoldering type of abscesses known as "cold abscesses" which are both troublesome and very likely to relapse. While four patients is a small number, the doctors are reporting these preliminary trials of the peroxide solution in the hope that other doctors will be stimulated to explore further its possibilities.

Science News Letter, March 29, 1947

AERONAUTICS

Flying-Wing Bomber Nears Completion

See Front Cover

➤ A FLYING-WING jet-propelled Army bomber is nearing completion at the Northrop plant, it has been revealed. It is the first of the type ever built.

This new plane, shown in the Army Air Forces photograph on the cover of this SCIENCE NEWS LETTER, which is all wings and has neither tail nor the familiar fish-shaped body, is a brother to the giant Flying Wing bomber and cargo ship which made its first flight test during 1946. Unlike it, however, it has no visible propellers to push it through the air.

This new jet-bomber, the YB-49, is powered by eight General Electric J-35 jet engines, capable of producing a total of 32,000 pounds thrust. They are arranged in two groups of four, one group on each side of the center. Like its older brother, the B-35, it is controlled by Northrop-designed elevons, a control surface that performs the functions of both elevators and ailerons in ordinary planes.

The new Flying Wing is 53 feet long and has a spread of 172 feet. The B-35 Flying Wing has the same span. Both are the nearest approaches yet made to airplanes consisting wholly of supporting surfaces. Almost every portion of both contribute to lift, and the parts of ordinary planes that contribute most to drag are lacking.

America is not the only country experimenting with jet-propelled flying-wings. The British have announced a twin-engine, jet-propelled, tailless plane that is now ready for tests in the air. It is considerably smaller than the YB-49, but plans for larger versions are already made. (See *SNL*, Jan. 25, 1947.)

Science News Letter, March 29, 1947

Colored flames in a fireplace may be obtained by mixing with the fuel lithium chloride for purple, strontium nitrate for red, copper sulfate for blue, and sodium chloride (common salt) for orange flames.

NUTRITION

Starvation Breeds Unrest

Underfed people of Europe are in danger of civil unrest. Hungry children cannot learn to be good world citizens on empty stomachs.

➤ A POPULATION getting less than 1,900 calories per person is in danger of civil unrest, Dr. Arnold P. Meiklejohn, senior consultant in nutrition in the UNRRA European Regional Office, declared at a conference in Washington.

He cited 16 hunger strikes and some hunger marches that occurred in Austria last spring before UNRRA supplies began to flow into that country. Observations of underfed people in Europe and of conscientious objectors who were the guinea pigs for famine studies at the University of Minnesota both show that people on short rations are affected mentally as well as physically. Irritability, apathy and sensitivity to noise are among the effects noted.

Underfed children fail to grow normally. Even worse, from the standpoint of future world understanding and peace, they fail to learn. Many children in Europe today are going to school without breakfast, Dr. Meiklejohn reported. "It is hard to learn on an empty belly," he commented.

Relief shipments of grain should be wheat, not corn, unless dried milk or some kind of milk product can also be made available. This, he explained, is because of the danger of pellagra developing among people living on a corn diet. Milk supplies the pellagra-preventing vitamin and so does wheat if the wheat is not milled in a way to remove the vitamin.

Except for rickets in children, for which cod liver oil is needed, there has been little or no vitamin deficiency disease in Europe. Major epidemics have not occurred, but the tuberculosis death rate is twice what it was before the war.

Infant mortality is also well above prewar levels. In some regions of Poland and Yugoslavia, one out of every three children born died during the first year of life. Overcrowding, lack of sanitation, and fatigue and underfeeding of the mothers is responsible.

The reason postwar health conditions have been no worse, Dr. Meiklejohn said, is that enormous quantities of UNRRA food went into Europe. This food averted major famines in Greece, Yugoslavia and Austria.

Science News Letter, March 29, 1947

PHOTOGRAPHY

Matchbox Camera For OSS

➤ TINY CAMERAS, small enough to hold in the palm of a person's hand or to be disguised as match boxes, were used by the OSS and underground forces during World War II.

The story of the matchbox camera, and the vestpocket darkroom which was used with it, have been revealed by the Eastman Kodak Company, which made 1,000 of the cameras in a secret, wartime project.

Pictures about one-half inch square were snapped with the tiny cameras for intelligence use and to supply pictures for various "resistance" newspapers. Film was developed in a small glass holding a jigger of solution. Complete equipment for processing the films was contained in a pocket-size darkroom outfit which had rolls of 16 mm. film, photo chemicals in pill form and other items needed for developing the small film.

Designated "M. B.", the camera could hold two-foot coils or spools of film with about 30 exposures each. The lens was f.5 with one stop to shut the aperture to f.11, and the shutter speed was about one-fiftieth of a second.

With the subject in focus from about eight feet to infinity, the camera permitted "shooting from the hip" and had no view finder. It was operated by pushing a small plunger, which produced a slight click. Time exposures could be made using a wire lever.

Focal length of the lens was one inch and the angle of view approximately 45 degrees. A small stand and close-up lens permitted the camera to be used for copying photographs or printed matter.

The midget camera had a molded bakelite inner case sheathed in a dull black metal outer case. Plans for the camera began in 1943 and 500 were delivered in 1944, followed by an additional order of 500.

MATCHBOX CAMERA—This tiny camera could be concealed and used easily. Eastman Kodak Company built 1,000 of these for use by OSS agents and underground forces.

Science News Letter, March 29, 1947

MEDICINE

New Method Detects Pollen That Starts Asthma Attacks

➤ A NEW WAY of detecting the particular pollen that brings on an asthma attack in a sensitive person has been developed by Drs. Francis C. Lowell and Irving W. Schiller of Massachusetts Memorial Hospitals and Boston University School of Medicine.

Instead of injecting or scratching the pollen solution into the skin, these doctors have their patients inhale an aerosol, or very fine mist, of the suspected pollen. Before and after measurements are made of the patient's vital capacity, that is, the number of cubic inches of air he can forcibly expel from his lungs after taking a deep breath.

The vital capacity was reduced to as much as 60% of its pre-test value when the patient inhaled an aerosol containing an extract of the pollen that caused his asthmatic attacks. The reduction occurred usually within six to ten minutes and the vital capacity returned to the pre-test value within 50 minutes.

Science News Letter, March 29, 1947

MEDICINE

Cocktails Help Heart

Alcohol relaxes nerves and dilates blood vessels, letting blood reach heart and helping people with heart disease and high blood pressure.

➤ COCKTAILS ARE GOOD for people with heart disease, doctors at a conference in Cleveland of the new American Foundation for High Blood Pressure agreed.

The reasons are that the alcohol relaxes the nerves, reduces tension and dilates the small blood vessels. Constriction of the blood vessels raises the blood pressure, and this in turn can damage the heart. In coronary disease and angina pectoris the heart is in trouble because it does not get enough blood from its constricted or blocked arteries. Dilating them with a cocktail helps.

The popular warning, "Watch your blood pressure," said to a friend who is about to get angry, carries an important medical lesson. Anger, as is well known, temporarily raises the blood pressure.

Less well known is the effect on the blood pressure of unconscious rages. When these are aggravated by a situation that causes conscious anger, the blood pressure may be raised and not go down when the conscious anger is relieved by a temper outburst.

Fair, fat and fortyish women may hold in their bodies, another clue to high blood pressure and artery hardening. This relates to the body's handling of a fat-like chemical, cholesterol. The chemical is found in increased amounts in the walls of hardened arteries. Feeding the chemical to chickens speeds the process by which cholesterol is deposited in the artery walls to thicken them and spoil their elasticity.

In gall bladder disease, which often afflicts the woman who is fair, fat and forty, the body does not utilize fats properly and fails to get rid of excess cholesterol.

Doctors are not yet ready to advise any special anti-high blood pressure diet on the basis of these clues, but they believe the clues should be followed by further research.

Heredity may be the number one factor to investigate in the search for methods of curing or preventing high blood pressure. Why repressed rage leads to high blood pressure in one person and not in another may be a matter of hereditary constitution.

A trace of some chemical taken in food or drink every day may play a role. If two parts per million of fluorine in drinking water can mean the difference between good and bad teeth, the same trace amount of some chemical may mean the difference between arteries that remain soft and elastic and those that harden.

Science News Letter, March 29, 1947

VETERINARY MEDICINE

Livestock Disease Blitz

➤ A JOINT U. S.-Mexican "blitz" against foot-and-mouth disease below the Rio Grande is poised, ready to go into action now that the appropriation of the necessary $9,000,000 war fund has been put through Congress. Mexico has already pledged nine millions and a good bit over—and that is a good deal more for Mexico to spend than it is for us, on a ratio-to-national-income basis.

Wiping out the infection means wiping out not only animals known to be infected but also all healthy but unexposed animals in the neighborhood. The technique is rapid, drastic and ruthless.

First a deep trench is dug. This can be done quickly nowadays, thanks to the development in recent years of heavy earth-moving machinery. The condemned cattle are driven into it and killed by shooting. Then rubber-booted, rubber-clad men slash open the carcasses, to insure rapid and complete decomposition after burial. Quicklime is thrown into the trench, and earth filled in to a depth of at least five feet. Boots, rubber garments, barns, implements—everything that might possibly carry a trace of the virus—get a thorough scrubbing with strong lye water.

The quicklime may not be necessary, but it is used just to make sure. Deep burial really does the trick; the virus does not long survive contact with the soil and the aggression of the swarming soil micro-life.

A most important thing is not to leave any carcass where stray coyotes or other carrion-seeking animals can get at it. That is why deep burial is so much emphasized. Five feet of earth on top of a dead animal is more than any coyote, however hungry, will dig through to get a meal.

Science News Letter, March 29, 1947

Potency of *penicillin* is now measured by a quick photographic method developed at the University of California.

SCIENCE NEWS LETTER

Vol. 51 **MARCH 29, 1947** *No. 13*

The weekly summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C. NOrth 2255. Edited by WATSON DAVIS.

Subscriptions—$5.00 a year; two years, $8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents.

Copyright, 1947, by Science Service, Inc. Republication of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Entered as second class matter at the post office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., PEnnsylvania 6-5566, and 360 N. Michigan Ave., Chicago, STate 4439.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: **Edwin G. Conklin, American Philosophical Society; Otis W. Caldwell, Boyce Thompson Institute for Plant Research; Willard L. Valentine, Editor of Science.** ***Nominated by the National Academy of Sciences:*** **Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology.** ***Nominated by the National Research Council:*** **Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University; Alexander Wetmore, Secretary, Smithsonian Institution.** ***Nominated by the Journalistic Profession:*** **A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers; O. W. Riegel, Washington and Lee School of Journalism.** ***Nominated by the E. W. Scripps Estate:*** **Max B. Cook, Scripps Howard Newspapers; H. L. Smithton, Executive Agent of E. W. Scripps Trust; Frank R. Ford, Evansville Press.**

Officers—President: **Harlow Shapley.** ***Vice President and Chairman of Executive Committee:*** **Alexander Wetmore.** ***Treasurer:*** **Frank R. Ford.** ***Secretary:*** **Watson Davis.**

Staff—Director: **Watson Davis.** ***Writers:*** **Frank Thone, Jane Stafford, A. C. Monahan, Martha G. Morrow, Ronald Ross, Alexa M. Carroll.** ***Science Clubs of America:*** **Joseph H. Kraus, Margaret E. Patterson, Henry Platt.** ***Photography:*** **Fremont Davis.** ***Management:*** **Albert de Wolf Erskine.** ***Sales and Advertising:*** **Hallie Jenkins.** ***Production:*** **Dorothy Reynolds.**

AERONAUTICS

Racon Routes in Alaska

Radar beacon airways operated from seven stations will open the Great Circle route in bad weather from America to the Far East.

➤ RADAR BEACON airways in Alaska and the Aleutians, which the U. S. Army revealed recently will be established in the near future, will open up for use in bad weather the Great Circle, or short route, from America to the Far East.

Seven such stations are to be erected. The equipment to be used is the war-developed radar navigational beacon, known as "racon" for short, by means of which planes in the air determine their position by radar signals from ground stations.

The stations will be erected at widely distributed points, extending from southern Alaskan airports to Point Barrow on the Arctic and Nome on the Bering. One will be established on Adak in the Aleutians. This distribution will help exploratory flying in Polar regions, and also local traveling in Alaska itself. This is important; much of Alaska today depends upon dog-sleds and aircraft for transportation.

War-developed racon was first used experimentally late in 1942, but later played an important part in all theaters of combat. Developments have continued since the war and radar beacons are now used on the North Atlantic air route to Europe. This Alaskan installation is the first effort to provide radar coverage over established continental air routes, and will provide training to pilots for other radar airways to be established in continental United States.

Racon is an electronic beacon placed ashore at selected ground positions to serve both surface and air ships. When radar signals from transmitters aboard ships are received by the beacon, its transmitter is triggered and gives out automatically an answering signal in code. The code is its station identification. A navigator is able to fix his position in relation to the beacon by means of a simultaneous plot of both range and bearing of the beacon from the ship on the scope of his radar.

Racon airways can be used only by aircraft equipped with airborne radar units. The beacon signal can be received clearly up to 150 miles. The ideal distance planned for the forthcoming radar airways will be about 100 miles between installations of beacons. Racon can be used as a low approach aid and the radar beacon provides the pilot with exact headings to fly any distance from the touch-down point.

Science News Letter, March 29, 1947

PHYSICS

Fluxmeter Guarded U. S. Harbors From Enemy Craft

➤ A DEVICE known as the fluxmeter, which was connected to underwater cables, has been revealed as the guardian of U. S. harbors from enemy craft during the war.

The fluxmeter measures changes in a magnetic field, and in World War II it warned of ships or even small motorboats crossing the cables at the entrance of a harbor.

Iron and other materials in the craft passing over the cables changed the earth's magnetic field enough to be detected by the fluxmeter. The small voltages from the cable as metal objects passed through the harbor entrance were registered on the fluxmeter.

Thus, even small enemy craft, hidden from sight and with silenced motors, could be detected from shore stations. When unidentified ships or boats were detected, harbor forts were alerted and PT boats sent to investigate.

Science News Letter, March 29, 1947

PHYSICS

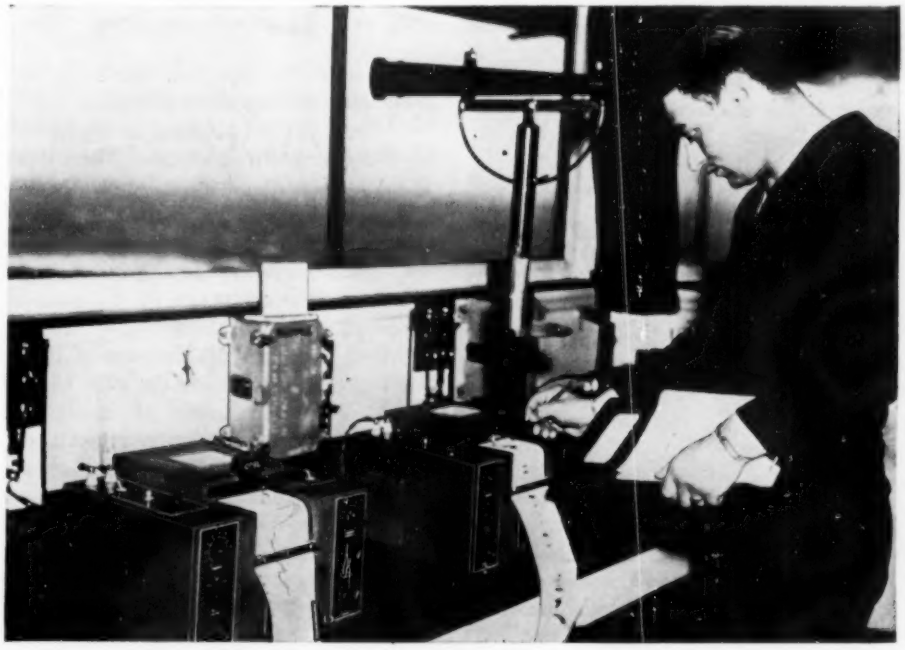
Lighting System Lessens Anger Among Night Drivers

➤ HAVE YOU EVER been heated up to the cussing-point, while driving at night with your lights dimmed, by having an approaching motorist flicker his lights at you? Darn fool didn't know the dimmer was on already!

To mitigate this cause of ill feeling among night drivers, a Washington inventor, Thomas M. Johnston, has devised a lighting system that adds a third lamp, directly in front of the radiator. This lamp is "off" when the main headlights are bright, "on" when they are dimmed. Thus if you see a car coming at you with three lamps all in a row, you will know that the dimmer is on, and there's no cause to flicker your lights at him.

The device is covered by newly-issued U. S. patent 2,417,501.

Science News Letter, March 29, 1947



HARBOR "WATCHDOG"—The fluxmeter, developed by General Electric, detected all vessels in critical waters during the war and gave a warning.

ENGINEERING

Synthetic Liquid Fuels

Petroleum reserves are limited, but the answer to independence from relying on other nations for fuels lies in synthetics. Bureau of Mines research is progressing.

By DR. R. R. SAYERS

Director of the U. S. Bureau of Mines

Radio talk given on "Adventures in Science" over the Columbia Broadcasting System.

➤ THE ENORMOUS drain of the war upon this country's supply of petroleum has brought us face to face with the realization that our remaining reserves are limited. And the demand is increasing steadily to provide power for automobiles, planes, ships, locomotives, industrial plants, and household heating units. Peacetime oil requirements are greater than those of the peak war year. We no longer have a reserve capacity for emergency use.

Our government has an answer—synthetic liquid fuels, the fuels of the future.

Oil Scarcity

We now seem to be passing from an era of abundant oil to an era of oil scarcity, so far as crude oil supplies in this country are concerned. We can not produce more from known fields without irretrievable loss. Oil is now being withdrawn from the wells at or near the maximum efficient rate. The cost of finding oil has risen sharply, and unprecedented volume of exploratory drilling has failed to locate the additional new reserves needed.

We are importing oil. But we should not place too great dependence on foreign sources of petroleum. We must develop auxiliary domestic fuel sources, to use in emergencies and, incidentally, to hold down the price that we must pay for foreign oil. This means we must develop synthetic liquid fuels—oil and gasoline obtained from coal, oil shale, and other materials.

In 1944, Congress directed the Bureau of Mines to design, build, and operate synthetic liquid fuel demonstration plants. Those will serve as models for private enterprise in a coming new industry which may well attain mammoth proportions.

Our coal and oil shale can make us wholly independent of foreign sources for many generations to come. But this will be true only after practical conversion of coal and shale has been achieved and large plant capacity provided. The Bureau's synthetic fuels program is the foundation for the establishment of this vitally important industry.

German Production

Germany was the leading European producer of synthetic fuels. Lacking enough petroleum, the Germans fueled their army and air force almost exclusively with oil and gasoline extracted from coal. But technicians from industry and the Bureau of Mines, following closely in the wake of our invasion troops, collected all of her plant and laboratory secrets and since then have added refinements of their own.

There are five major processes and sources of synthetic fuels, any or all of which may come into use in this country as petroleum supplies decline to the point where the higher-cost synthetics become commercially competitive with natural petroleum products.

Five Processes

Alcohols can be made from the fermentation of vegetable matter.

Natural gas is converted to liquid fuel by the gas synthesis process. Then there is distillation of oil shale.

The liquefaction of coal or lignite by the high-pressure hydrogenation process. Then there is conversion of water gas from coal or lignite by the gas-synthesis process.

All of these potential sources of liquid fuels are under study in the United States. The Department of Agriculture is investigating costs and manufacturing steps for the production of alcohol and other liquid fuels from agricultural residues, such as corn cobs. Private industry has announced plans for the construction of two commercial plants to convert natural gas to gasoline. Oil shale distillation and coal liquefaction are being studied by the Bureau of Mines.

At Pittsburgh, Bureau of Mines scientists have improved both the direct hydrogenation and indirect gas synthesis methods of converting coal to oil. In the hydrogenation process, lower pressures and lighter equipment are among the keys to production economy. Bureau of Mines men have found a way to convert coal to a distillable oil at relatively low pressures by employing special solvents and very active catalysts. Another radical departure from European practice is the discovery that coal may be hydrogenated in a dry or powder state. This simplifies the process by eliminating several costly and complicated steps, together with the equipment required for them.

Gas synthesis produces a superior grade of Diesel oil—a factor which interests our navy. We are investigating both processes, and our engineers today could build an improved hydrogenation plant with an over-all heat efficiency of 56% compared to a 29% maximum efficiency attained in the typical German plant.

Synthetic Liquids

The Bureau of Mines is burning an underground Alabama coal seam to determine how practical it is to produce a useful combustible gas without the expense of mining coal, a part of its synthetic fuels research. If as successful as is hoped, it may produce an almost inexhaustible source of synthetic liquid fuels and cheap electric power. Preliminary results are encouraging in the Bureau of Mines experiment, conducted with the aid of the Alabama Power Company. Although the gas produced thus far is not as rich as Bureau scientists believe possible, it still offers promise of many potential uses. It not only can be used for manufacturing synthetic gasoline and oil, but offers a new and novel source of heat and fuel for either steam or gas turbines and the generation of electric power.

If tests demonstrate that underground gasification is practicable, this country could tap innumerable coal deposits not now worth the expense of mining. This might even supplant conventional mining in part. It would result in a more complete recovery, for coal mines usually leave as much as 35 percent of their reserves in the ground.

Significant discoveries in getting fuel from oil shale have been made. Bureau of Mines chemists at the oil shale research and development laboratory in Laramie, Wyo., have developed a thermal solution process which employs

hot solvents to extract oil from the shale. With it, they have obtained more oil out of the shale than the assay estimated was in the shale. The Bureau's oil shale demonstration plant near Rifle, Colo., will be put in operation during the next two or three months. Coal, however, is this country's real future source of fuel. Excluding atomic energy materials, coal comprises 98.8% of our mineral-fuel energy reserves, whereas oil shale amounts to only 0.8%, petroleum to 0.2%, and natural gas to 0.2%.

Bureau of Mines research findings and patents will be made available to all industry, large and small, and to any interested citizen. A technical advisory committee composed of some of industry's leading coal and petroleum experts has been named to assist the Bureau and is kept abreast of all plans and developments.

We are not waiting until a crisis and the Nation's economy and security are in jeopardy. When we are spending more than 10 billion dollars a year to maintain an army and navy, it does not appear unreasonable to spend at least one two-thousandth of that sum —or $5,000,000—to make sure that the planes, tanks, and ships will be able to move.

Science News Letter, March 29, 1947

PSYCHOLOGY

Problems from Brain Maps

Frustration or too much motivation may narrow brain maps, formed in learning, causing psychological difficulties of men and nations.

➤ INADEQUATE "brain maps," narrowed in the learning process by too intense motivation or too much frustration, may be the key to the psychological difficulties of men and nations, Dr. Edward C. Tolman, University of California psychologist and expert on animal behavior, declared in the annual Faculty Research Lecture in Berkeley.

Both rats and men, Dr. Tolman said, form in their brains what he calls "cognitive maps" of the environment during learning. On a simplified scale, for example, a rat running through a maze to a goal such as food or water forms in its brain a "cognitive map" of the maze environment.

If the rat is permitted to roam the maze when well fed and with plenty to drink, it appears to learn nothing. But if later placed in the maze when hungry, the rat readily proves it has learned by going to the goal. Under these optimum conditions the rat has been able to form a broad cognitive map of the environment.

If, on the other hand, the rat learns the maze when hungry and thirsty, its cognitive map is narrowed by intense motivation. The correct route to the goal is fixated in the brain and if this is blocked, the strain of intense motivation and frustration makes it difficult for the rat to learn a new route.

This mechanism of too strong motivation and too much frustration is seen at the human as well as the animal level, Dr. Tolman declared. The "cognitive maps" of children may be narrowed by an overintense striving for material wealth. When this is not forthcoming, the individual takes out his frustration on "out-groups."

"Over and over again," he said, "men are blinded by too intense motivations into blind and unintelligent and, in the end, desperately dangerous hates of outsiders. The expression of these displaced hates ranges from discrimination against minorities to world conflagrations."

"We dare not let ourselves or others become so over-emotional, so hungry, so ill-clad, so over-motivated that only narrow strip maps are developed. We must subject our children and ourselves to the optimal conditions of moderate motivation and to the absence of unnecessary frustration whenever we put them and ourselves before the great God-given maze which is our human world."

Science News Letter, March 29, 1947

In territory formerly German but now Polish, there is an estimated reserve of nearly 15,000,000,000 tons of brown *coal;* this coal can not be stored over ground for periods of time because it has up to 50% water content.

ENGINEERING

Metals for Jet Engines Tested in Special Dugout

➤ SPINNING, RED-HOT metal disks in a special dugout at the Westinghouse Research Laboratories in Pittsburgh are going to help develop parts for future jet engines.

Heated to temperatures above 1,400 degrees Fahrenheit, the disks will spin at speeds of 1,200 miles per hour until they fly apart. The disks, made of specially developed alloys, will reveal the maximum strength of the materials to help engineers plan new alloys for engines.

The "metal torture" tests will be made in a dugout sunk 10 feet below floor level and lined with sandbags.

Metals to be tested are used in the rotors of present gas-turbine engines where they stand up under terrific stress and temperature. In the tests, actual operating conditions will be exceeded to find out how much heat and stress is needed to break up the metal.

From the tests in the dugout, Westinghouse engineers hope to devise principles from which they can predict the behavior of metals at any speed or temperature.

The disks, which will whirl at 35,000 revolutions per second, are one foot in diameter and one inch thick.

Science News Letter, March 29, 1947

SANDBAG DUGOUT—To measure the strength of jet engine alloys, Westinghouse scientists use a high-speed motor to whirl the metal disks being tested.

CHEMISTRY

New Yeast Fermentation Yields More Glycerin

➤ GLYCERIN, needed in huge quantities for a thousand industrial purposes, is in short supply because of the scarcity and high price of fats used in soap making, of which it has long been a co-product. Its production directly from sugars by yeasts or other microorganisms, though possible, has been attended with some difficulties. Newest effort to overcome these is embodied in U. S. patent 2,416,745, issued to a team of three microbiologists, Prof. Ellis I. Fulmer and Dr. L. A. Underkofler of Iowa State College at Ames, and Dr. Richard J. Hickey of Terre Haute, Ind.

Ordinary yeast fermentation produces a little glycerin along with the ethyl alcohol. Addition of a soluble sulfite to the sugar solution upsets the fermentation chemistry in such a way that larger quantities of glycerin are produced. Carried on in an alkaline medium in the past, this production has still not been satisfactorily large because yeasts do not thrive on alkaline conditions. In the new process, the medium is acidified, making it possible for the yeast to work more efficiently.

Rights in the patent are assigned to the Iowa State College Research Foundation.

Science News Letter, March 29, 1947

ZOOLOGY

"Timid" Deer Prove Courageous in Defense

➤ DEER, proverbially timid and helpless, are capable of courageous fighting in defense of one of their own, even when the battle is hopeless. First-hand account of such a fight is presented by Victor C. Cahalane, U. S. National Park Service naturalist, in the *Journal of Mammalogy* (Feb.).

In Grand Canyon National Park, one autumn afternoon, he saw three coyotes pull down a deer. They were so preoccupied with their efforts to kill their victim that he was able to get within about 60 yards of the struggling group without being observed.

He had been watching the woodland tragedy for only a few minutes when a band of seven deer, six of them does, appeared on the scene. They approached slowly, until the coyotes, sensing their presence, formed a defensive front against them.

"The precaution was well advised," states Mr. Cahalane. "The largest doe took the offensive several times. Lunging into the midst of the coyotes, she struck vigorously with her front hoofs together. With ears laid back and eyes protruding, she was transformed into a veritable Fury. Each time that she singled out a coyote and charged, that animal beat a hasty retreat, sometimes backing off eight or ten yards."

It was in vain, however. The stricken deer had been hurt beyond any chance of recovery, and the bold female champion, with one younger backer who finally joined her, was in danger of being attacked on the flank. So the attempted rescue had to be abandoned.

Once successful in killing their victim, the three coyotes proved less cooperative than the deer had been in threatening them. They quarreled over the booty, with one lame-footed female bullying her two smaller companions and taking first rights to the prey.

Science News Letter, March 29, 1947

ENGINEERING

Gas Expansion Turbines Used in Oil, Gas Fields

➤ NATURAL gas expansion turbine engines are rapidly replacing reciprocating engines in gas and oil fields, the American Society of Mechanical Engineers in Tulsa, Okla., was told by Stephen Bencze of the Elliott Company, Jeannette, Pa., well-known as a manufacturer of gas turbines.

This gas expansion turbine is not the relatively new gas turbine engine. The gas-expansion type is driven by gas in the same way that steam drives steam turbines. The gas used to drive the turbine is not burned in the process. It is merely expanded by heat. After discharge from the engine it can be used for any of the purposes for which it was originally suitable.

Gas turbine engines, on the other hand, are powered by gases created by combustion from liquid or gaseous fuels. A new type will burn a very finely pulverized bituminous coal. The exhaust gases have no subsequent value.

The increasing use of the natural gas expansion turbine engine in oil and gas fields, to drive pumps, generators, fans and other equipment, is due to its economy and efficiency. Some of them are so constructed that they can be converted quickly into steam turbines if the gas supply is temporarily exhausted.

Science News Letter, March 29, 1947

IN SCIENCE

HORTICULTURE

Fatal Orange Disease Is Found in Australia

➤ TRISTEZA, a virus disease highly fatal to sweet-orange trees grafted on sour-orange stocks, has been found in Australian citrus orchards, according to information received at the U. S. Department of Agriculture. It is apparently South African in origin, and got a foothold in the Netherlands Indies and South America. It received its name from the terrible destruction it wrought in Brazil: "tristeza" means "sadness" in both Portuguese and Spanish.

A disease having exactly the same symptoms but spreading much more slowly from tree to tree has been known for some time in California, under the name "quick decline." (See *SNL*, Feb. 22.)

Australian citrus men apparently consider the two diseases to be identical. The slower spread in California orchards may be due to the much more thorough spraying and disinfection schedule practised in them, which would presumably decimate and slow down the still-unknown insect carrier of the virus.

Science News Letter, March 29, 1947

PLANT PHYSIOLOGY

2,4-D Takes Plant Life By Internal Suffocation

➤ 2,4-D KILLS plants by robbing them of the ability to utilize oxygen in their life processes; in effect, it acts by a kind of internal smothering. Experiments pointing to this conclusion are reported in *Science* (March 14), by two Chinese plant physiologists, Dr. Y. L. Hsueh and Dr. C. H. Lou, of Tsing Hua University, Kunming, China.

Like many other compounds, 2,4-D was found to be a stimulant at low concentrations and a poison at higher ones. In its growth-stopping concentrations, it wholly prevented the germination of seeds that normally require oxygen for their sprouting. But the same concentrations only delayed, and did not prevent, the germination of rice, which normally sprouts under water without aid from the oxygen of the air.

Science News Letter, March 29, 1947

E FIELDS

ICHTHYOLOGY

It's a Girl Always For "Amazon Molly"

➤ "AMAZON MOLLY" never has any sons, only daughters. Not only that, but no matter who their father is, the youngsters never look the least bit like him, resembling only their mother.

"Amazon Molly" is a guppy-like fish native to Texas and northern Mexico. To scientists she is *Mollienesia formosa.* No male fish of the species has ever been found.

Dr. and Mrs. Carl L. Hubbs of the Scripps Institution of Oceanography in La Jolla, Calif., have during the past dozen years mated "Mollies" with males of 56 related species, breeding something like eight thousand young fish representing 20 generations.

No luck. All daughters. And not one looked like her Pa.

Science News Letter, March 29, 1947

BIOCHEMISTRY

New Biochemical Test Tells Exact Week of Pregnancy

➤ A NEW BIOCHEMICAL test for pregnancy, that tells with fair accuracy how many weeks have elapsed since conception, has been developed at the University of California Medical School by Dr. Ernest W. Page, who reports his results in *Science* (March 14).

The test is based on the presence in the blood of pitocin, one of the secretions of the pituitary gland. Something in the blood of pregnant women destroys this substance; and the farther pregnancy has advanced the more rapid is the rate of destruction. Dr. Page postulates the existence of a still-unisolated pitocin-destroying enzyme, which he has named pitocinase.

The test consists in adding to a blood serum sample from the prospective mother a small measured quantity of commercial pitocin and keeping it warm in an incubator. At intervals, fractions of the serum are withdrawn, chemically treated, and applied to reproductive tissue from a laboratory animal to test a biological reaction. The process is complicated, but in the hands of a sufficiently well-trained technician can tell the week of pregnancy, between the fourth and the sixteenth. Before the fourth, Dr. Page states, "there is no known pregnancy test which may be considered accurate." After the sixteenth week, methods already in use are more rapid and satisfactory.

As a simple "yes-or-no" test, Dr. Page makes no special claim for his method. He says, "Despite its economy, this method, when used as a purely qualitative indication of pregnancy, requires more time and skill in its present form than a Friedman or Aschem-Zondek test."

Science News Letter, March 29, 1947

MEDICINE

Emotional Epilepsy Is Frequent Sickness

➤ A LITTLE KNOWN type of epilepsy, often confused with petit mal and which is sometimes accompanied by acts of a violent nature, is much more prevalent than has been supposed.

Dr. Charles D. Aring, professor of neurology in the University of California Medical School, describes the condition, called psychomotor epilepsy, in *California Medicine* (Feb.).

He said that when recognized the disease is easily treated by the proper administration of either or both of the two anticonvulsant drugs, dilantin and phenobarbital.

Dr. Aring said that in this type of seizure an emotional disorder is a frequent manifestation. He said that it can be distinguished from petit mal epilepsy if physicians remember that the latter rarely occurs in adults and that it is usually of brief duration (five to thirty seconds), usually without movements or activities, except in or about the eyes.

He added that diagnosis is aided by electroencephalography, the study of electrical activity of the brain. A period of amnesia, whether long or short in duration, may in some cases be associated with this type of epilepsy.

"Any person experiencing rather short episodes of unusual behavior for which he has no memory might well be suspected of suffering from attacks of psychomotor seizures," Dr. Aring stated.

The physician pointed out that the condition raises the question of legal responsibility for acts, sometimes of a violent nature, which may be committed during the attack of psychomotor epilepsy. This seems to have been largely overlooked in the courts, he said.

Science News Letter, March 29, 1947

MATHEMATICS

Electronic Device Computes Engine Temperatures

➤ MECHANICAL ENGINEERS at the University of Wisconsin have invented an electronic computer which can "solve" the complex mathematical formulas by which engineers learn the temperature of exploding gases in engine cylinders.

The device makes the work now being done with diesel engines many times more accurate, quick and efficient. It has been developed as a scientific accessory to the electro-optical pyrometer which gauges the temperature of exploding gases within the cylinder of an expermental diesel engine. Work with the pyrometer may in the future result in the designing of new and better diesel engines.

Engineers formerly spent hours solving the equations which told the temperature of the diesel explosions, first taking a reading from two oscillographs, consulting a graph, and then plotting the mathematical result on paper and determining an "average curve."

The new device now plots on an oscillograph the temperature of an explosion or series of explosions. The oscillograph is photographed every few seconds by a special camera for permanent records.

The electro-optical pyrometer is an electronic thermometer. By comparing the intensity of two beams of light of different colors which emanate through a quartz window imbedded in the diesel cylinder wall the engineers compute a ratio which reveals the temperature within the cylinder.

Science News Letter, March 29, 1947

PHYSICS

Thin Tungsten Wire Is Invisible to Eye

➤ TUNGSTEN, the metal that is used for light bulb filaments, has been made into a wire that is so thin that a pound of it would stretch in a single strand 950 miles.

The wire is 0.00018 inch in diameter, and was produced by the Westinghouse Lamp Division for use in an amplifying tube for the Bell Laboratories.

One thousand feet of the thin wire, reeled on a bobbin, is invisible to the naked eye, and a 20-layer stack of the wire is about the thickness of a sheet of a newspaper.

Science News Letter, March 29, 1947

ASTRONOMY

Jupiter Joins Saturn

Giant planet reappears in the constellation of Libra low in the southeast late on April evenings. Saturn is high in southwest and sets about midnight.

By JAMES STOKLEY

➤ JOINING SATURN, for several months the only planet visible in the evening sky, Jupiter now comes into view. It is in the constellation of Libra, the scales, whose position, low in the southeast, is shown on the accompanying maps. These diagrams depict the skies as they appear about 10:00 p. m. at the beginning of April and 9:00 p. m. around the 15th. These hours are in your own kind of standard time.

A few months ago Jupiter was a brilliant morning star, visible in the east just before sunrise, close to Venus. Because the appearance of the skies, in general, advances two hours each month, at 10:00 p. m. this month they look about the same as at midnight in March, 2:00 a. m. in February, 4:00 a. m. in January and 6:00 a. m. in December. In recent months Venus has been moving eastward through the skies, so it is still a morning star, but Jupiter moves much more slowly and now it is coming into evening view.

Saturn Is High

Our other planet, Saturn, is high in the southwest. Due south at sunset, it sets around midnight. By that time, Jupiter has climbed near the meridian. Saturn, of magnitude 0.4, is considerably fainter than the minus 2 of Jupiter. It is in Cancer, the crab, one of the least conspicuous of the constellations of the zodiac, path of the sun, moon and planets. Much more prominent are the next-door figures of Gemini, the twins, to the right, with brilliant Pollux; and Leo, the lion, to the left. In Leo is a smaller group known as the sickle, first magnitude Regulus marking the end of the handle.

Next to Leo, along the zodiac toward the east, is Virgo, the virgin, with another star of the first magnitude, Spica by name. Above Virgo, in the east, is Bootes, the bear-driver, in which Arcturus shines.

In April evening skies the glorious constellations of the winter are making their last bow in the west. Orion is shown directly west, on the horizon, with Betelgeuse remaining visible. Nearby, farther south, is Sirius, the dog star, in Canis Major. To the right of Orion, shown in the map of the northern half of the sky, is Aldebaran, in Taurus, the bull. Though a star of the first magnitude, it is shown fainter on the map. It is so low that its light is dimmed. Above Taurus, in Auriga, the charioteer, is Capella. Shifting to the northeast, we can see Vega, in Lyra, the lyre, another brilliant star appearing fainter because it is so low. Vega, however, is now coming into view, and in the next few months it will be much more prominent, while Orion and his neighbors vanish completely for a while.

Venus Brightest

Of the other three naked eye planets, besides Jupiter and Saturn, only Venus is visible during the night. This, as mentioned above, is a morning star, in the constellation of Aquarius, which is low in the southeast at sunrise. Venus has a magnitude of minus 3.4, which makes it brighter than any other star or planet. Both Mercury and Mars are now too close to the sun to be seen.

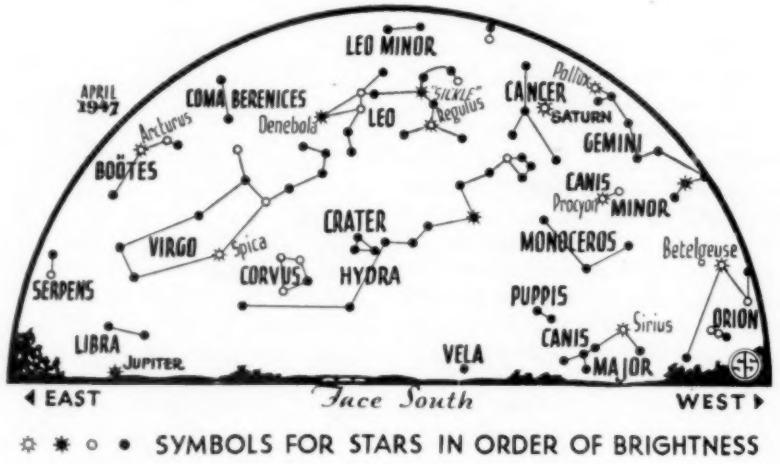
Of the 12 constellations of the zodiac—Aries, the ram; Taurus, the bull; Gemini, the twins; Cancer, the crab; Leo, the lion; Virgo, the virgin; Libra, the scales; Scorpius, the scorpion; Sagittarius, the archer; Capricornus, the sea goat; Aquarius, the water-carrier and Pisces, the fishes—Leo is the most famous. This is the figure which we see at its best on April evenings. However, its importance seems to come from the fact that the sun stands in the direction of Leo during the summertime.

Skies Rotate

There is a slow movement of the skies, called the precession of the equinoxes, by which the constellations of the zodiac slip all the way around in about 26,000 years. At present the sun is in Leo during August and September. On Aug. 23, it passes Regulus. Thousands of years ago, when the constellations were established, it passed among these stars in June, when the sun was at its highest for the year. Thus there seemed to be a connection between this most ferocious of beasts and the ferocity of the hot sun at this time of year. The Greek poet Aratus wrote (in the second century B. C.):

> "The Lion flames. There the sun's course runs hottest.
> Empty of grain the arid fields appear
> When first the Sun into the Lion enters."

To the Egyptians there was another connection between this group and the species Leo. It was during the latter part of July, as the sun went through this figure for them, that the Nile attained its highest level. This brought the lions from the desert to the Nile Valley, to escape the heat. Perhaps as a result the Egyptians made use of the head of a lion on the gates of the canals connected with the Nile for irrigation. This is be-



lieved to be the origin of the lion's head figure in more modern fountains, where a stream of water squirts from the animal's jaws.

Celestial Time Table for April

April.	EST	
5	6:00 a. m.	Mercury farthest west of sun (but not far enough to be easily visible)
	10:28 a. m.	Full moon
8	4:47 p. m.	Moon passes Jupiter
12	8:00 a. m.	Moon farthest, 251,200 miles
13	9:23 a. m.	Moon in last quarter
18	12:37 a. m.	Moon passes Venus
20	11:19 p. m.	New moon
21	early a. m.	Meteors of Lyrid shower visible
24	6:00 a. m.	Moon nearest, 227,800 miles
27	8:23 a. m.	Moon passes Saturn
	5:18 p. m.	Moon in first quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, March 29, 1947

ARCHAEOLOGY

4,000-Year Old Epic Poem Tells of "War of Nerves"

➤ A "NEW" EPIC poem, scratched in clay 4,000 years ago, is being translated by Dr. Samuel N. Kramer of the University of Pennsylvania Museum.

Unearthed half a century ago in the Near East, the poem is the oldest and longest Sumerian poem known. Sumer, where the ancient literature was written, was the southern division of ancient Babylonia.

The story told in the poem, which deals with events 1,000 years before the author wrote his epic, or 5,000 years ago, sounds like a modern tale. Dictators, psychological warfare and political intrigue are all important elements in "Enmerkar and the Lord of Aratta," the title Dr. Kramer has given the ancient work.

Smaller than an ordinary sheet of writing paper, the tablet on which Dr. Kramer found the poem was rediscovered by the archaeologist in the Museum of the Ancient Orient, Istanbul, Turkey. Dr. Kramer made his find during the past seven months while engaged in research in the Near East under the joint sponsorship of the University of Pennsylvania Museum and the American Schools of Oriental Research.

The small slab with the epic scratched on it is a 12-column tablet containing a record total of more than 600 lines of Sumerian poetry.

Enmerkar, hero of the poem, was a Sumerian hero who ruled the biblical Erech, a city-state in southern Mesopotamia. The epic tells how the ancient Sumerian used a "war of nerves" to capture a wealthy city nearby without bloodshed.

Dr. Kramer has translated enough of the ancient story to define clearly the main characters and the plot, but a full translation and interpretation will require further work.

Science News Letter, March 29, 1947

PHYSICS

Static-Reducing Devices To Aid Commercial Pilots

➤ CLEARER RADIO communications in bad weather and greater air safety are promised by simple wartime devices now being made available to commercial flying.

The devices are static dischargers and suppressors for shielding planes from accumulating static which disrupts radio communications in a storm. During the war, the dischargers and suppressors were credited with aiding safety of military planes, but all production went to the military. Now the devices have been released from government restrictions and are available to commercial flying, the Air Materiel Command said.

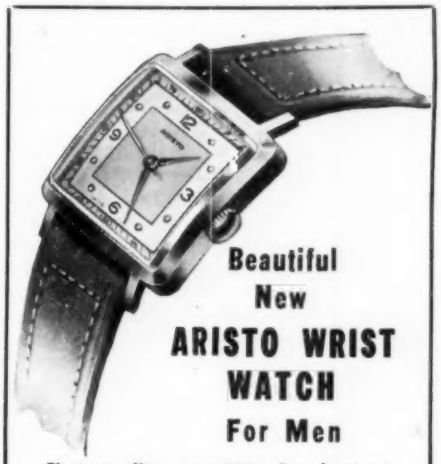
Consisting of a series of antenna insulators, tension units and conducting cotton wicking, the anti-static equipment is designed to fight precipitation static, which interferes with radio communications.

Precipitation static is set up in aircraft radio equipment when the electricity accumulated by the plane in flight is greater than in the surrounding air. This situation comes during storms and bad weather when dust, sand, smoke, ice crystals, snow crystals or rain strike against the surface of the plane and generate static electricity.

By shielding the plane and carrying off the accumulating static, the dischargers and suppressors reduce the interference with radio communications.

The Air Materiel Command laboratories at Wright Field developed the antenna insulation system during the war, while the wick dischargers were made in cooperation with the Naval Research Laboratories. The equipment has been manufactured by Dayton Aircraft Products, Inc., Dayton, Ohio, under government contract.

Science News Letter, March 29, 1947



Beautiful New ARISTO WRIST WATCH For Men

First quality seventeen jewel movement cased beautifully in all stainless steel imported case.

Center Sweep-second hand. Raised gold numeral dial. Pigskin leather strap. Gift box.

As precise as our high grade Chronographs and as beautiful as modern styling can make it.

Regular retail price $45.00, plus tax.

Our usual special offer **$37.50**

Tax included Postpaid.

Send check or money order or request C.O.D. shipment.

PRATT & MORRIS

Distributors

27 Cleveland St. • Bergenfield, N. J.

SCIENCE SINCE 1500

By **H. T. PLEDGE**

Librarian, Science Museum of London

FROM THE TABLE OF CONTENTS

SCIENCE AND PRE-SCIENCE—From Ancient Greece to the second Renaissance. Pre-science: isolation; lack of specialism; symbolism; mysticism. State of certain sciences 1450–1500: perspective and anatomy; mechanics; mines and chemical crafts; lack of physics.

BIOLOGY BEFORE THE MICROSCOPE—Mode of exposition adopted in the book. Weakness of botany without technical terms; teleology and science. Commentators, artists and doctors; naturalistic and diagrammatic plates; Vesalius; the Paduan line. Weakness of physiology without the idea of the physical; Harvey and the pump-idea. Lack of microscopes the limiting factor here and in early embryology.

ASTRONOMY BEFORE THE TELESCOPE—Experiment and observation. Earth and sun rival centres before the modern period. Technical advances and the great explorations; mapping; the Iberian contribution. Copernicus, Brahe, Kepler; the German contribution. Stirrings of the idea of the physical.

MATHEMATICS BEFORE THE CALCULUS—Some Greek points of view; rigour, music, and mysticism. Pure mathematics: Symbolism and suggestiveness; equations; Italian contribution. Computation: "calculating machines" preceded paper computation, which brings in a second dimension. Single-radix numeration; decimals; logarithms. Navigational astronomy as the stimulus.

THE 17TH CENTURY—War and order. Learned societies. Bacon and Descartes; philosophy and science; from the circle to the straight line as the "natural" path.

MECHANICS, ASTRONOMY, OPTICS, especially in the 17th Century—Stevinus, hydrostatics; Galileo, dynamics. Twofold importance of *glass:* telescopes and the end of Ptolemy, and barometers, defining the concept of a gas and of the physical. Thence, choice of mass as fundamental. Conservation principles in science. Gravitation, action at a distance. Light. Minimum principles in science. Waves and projectiles. 18th-century instruments. The idea of compensation: achromatic lenses and compensated chronometer.

MATHEMATICS (1600-1800)—Geometry restarts: from perspective to projective geometry; from mapping and equations to coordinates. Infinity: gradients and areas and infinite series. 18th century; analytical mechanics; minimal theories again; doubts of the calculus; the "insoluble" problems—quintics and elliptic integrals; the ambition of formulation.

MICROSCOPY, CLASSIFICATION, GEOLOGY—The descriptive and observational sciences. "Classical" microscopy, embryology, spontaneous generation, preformationism. Classifying, naming, comparing; relation to physiology; spirit formal and static; Linnaeus, Cuvier. Geology separates from cosmology; parts played by volcanoes, mines, etc., in its history; Guettard and Desmarets; Werner; Hutton; Cuvier.

THE 18TH CENTURY—Formalism and systematism; examples from medicine; reaction to revolution, political, agricultural, industrial. Premature applied science. Germany's greatness still ahead.

EXPERIMENTAL SCIENCE I—Interdependence of experimental physics, chemistry, and physiology. Heat and gases as key ideas; their confusion (17th century) and separation (18th). Vitalism and mechanism. Heat: thermometers, calorimetry, material theory. Chemistry: notes on technique. From principles (phlogiston) to substance (after Lavoisier) and weights. Oxygen monism. Gases again; atoms and Dalton. Application to physiology; respiration.

EXPERIMENTAL SCIENCE II—Qualitative electricity and magnetism. Physiology (Haller, Galvani) gives the sensitive detector needed for the discovery of currents; electrolysis. Dualism in chemistry; Berzelius and professionalism; atomic weights; analysis systematised. Organic chemistry; isomers, radicals, types; anarchy of the fifties. Physiology; the tradition of great teachers; the cycles, especially of nitrogen; digestion; nerves and senses, Helmholtz.

MATHEMATICAL PHYSICS—Certain ideas which always fascinate: vortices, crystals, waves; the second (*c.* 1800) leads to the triumph of the third in optics, but the first will be needed to complete the picture. Quantitative electricity and magnetism, ignoring dielectrics; historical importance of thermoelectricity; mathematicians and picture-thinkers. Kinetic theory, energy (contribution of physiology), thermodynamics, statistics. Radiant energy. Electromagnetic theory; vortices enter from hydrodynamics and unite electricity and optics.

THE 19TH CENTURY—The world-wide spread of white man. The revolution opens the flood gates of French genius; the Romantic Epoch enchains Germany at first. Industrialism and the struggle for existence; mechanical models, statistics, continuity in English thought. Emergence of Germany.

EVOLUTION AND THE MICROSCOPE—Achromatic microscopes, giving cell theory. Naturphilosophie, morphology, embryology. The stage set for evolution. Buffon, Lamarck, the burst of hereditary aptitude in England. Influence of islands. Discussion of Darwinism. Distribution; the oceans; formalistic remnants expelled. Systematics: influences of conservatism, economics, and discoveries in physiology. The (non-Greek?) tradition as to infection. Jenner, Pasteur, Lister; staining and the microtome; the biochemical point of view.

19TH-CENTURY MATHEMATICS I AND II—Its philosophical character: rigour, generalised quantity and space. Gauss and theory of numbers. Continuity, function, complex variable. From quintics to algebraic numbers, many-unit quantities, generalised algebras; also to groups, transformations and invariants; thus to geometry: non-Euclidean and n-dimensional; projective geometry; Klein, Poincare; differential equations and mechanics; sets of points; towards general topology. Philosophy of mathematics.

(Continued on following page)

"A THOROUGH-GOING HISTORY OF SCIENCE"

$5.00

"The author takes the subject and the reader in his stride on a journey which must be ranked as a very able performance, indeed. The illustrations are excellent, the bibliography is unusually helpfully arranged, and the indices are full and satisfactory."

—M. F. Ashley Montagu, The New York Times

"H. T. Pledge, of the Science Museum, London, has given a remarkably complete account of mathematics, physics, chemistry, and biology in his period, based on careful scholarship, and he has included some original features. He has not overlooked the question of the social relation of science, which is now converting the history of science from a minor into a major subject. A standard book in all libraries, and in particular it will be a perfect science prize for educational institutions."

—The Manchester Guardian

FROM THE TABLE OF CONTENTS (*Continued*)

MAINLY ORGANIC CHEMISTRY—Experimental science again. End of the anarchy of the fifties in chemistry; groups of elements, homologous series; Avogadro's hypothesis; periodic law. Organic: crystals again, stereoisomerism; biochemistry and chemical industry; aromatics; typical constitutions. Notes on apparatus, especially chemical.

SURFACES AND IONS—Physical chemistry: balanced actions and thermodynamics. Electrochemistry; Raoult, osmosis; ionic dissociation theory, gas analogy. Colloids and surface chemistry. Catalysts and enzymes: surfaces again.

CYTOLOGY AND GENETICS—Cell division and union with the aid of new microtechnique; Weissmann. Ancient experiments in breeding; the part played by religious houses; pre-Mendel and Mendel; the gene; heredity and environment; the gene-complex; relation to evolution.

GROWTH AND UNITY OF THE INDIVIDUAL I—Embryology; cytological and evolutionary; experimental; technique of tissue culture; "rate genes." Nerves; neurons, integrative action; adrenaline and acetylcholine, importance of ultra-sensitive instruments; electrochemical models for nerve and muscle.

GROWTH AND UNITY OF THE INDIVIDUAL II—Internal secretion; dependence of our knowledge on antiseptic and other operative advances; the integration of the individual; plant hormones. Deficiency diseases; metabolic thermodynamics; vitamins. Some biochemical points: vitamins, pigments, respiration, and photosynthesis.

ECOLOGY—Pigments continued (vision); comparative biochemistry; the interrelations of life, that is, ecology. Its chief ideas and economic relations; soil science; parasitism, fluctuations, their mathematics and relations to evolution.

MODERN EXPERIMENTAL PHYSICS—Vacuum pumps and tubes; electrons; radioactivity; the planetary atom; atomic number; isotopes; projectile physics and new ultimate particles.

QUANTUM THEORY—Statistical and radiational theories and their erroneous result. Interferometers; line spectra, and no explanation. Quanta; Bohr; correspondence principle; matrices and wave-mechanics; probability and uncertainty; the relativistic equation.

RELATIVITY AND COSMOLOGY—The interferometer and special relativity. General relativity; efforts to geometrise electromagnetism. Astrophysics: Laplace's hypothesis and the alternatives; the spectroscope and spectral classifications; the galaxy; stellar evolution. Cosmological consequences of general relativity; Einstein and de Sitter; Milne and Eddington.

REAL MATERIALS I AND II—Subjects of Chapters XIV and XV revived by fresh elements from physics: crystals (once more) and X-rays; from valency to lattice and (with quanta) to the architecture of the solid state. Surfaces again; oriented films. Fibres and proteins; "templates." From ideal to real materials; real gases and electrolytes; reaction kinetics, activation, chains, reactions at surfaces; real liquids, vortices, boundary layers, in relation to the weather, ships and aeroplanes; real solids, geophysics.

CONCLUDING DISCUSSION • BIBLIOGRAPHICAL NOTE • SUBJECT INDEX • NAME INDEX.

ALSO, ILLUSTRATIONS, GRAPHS, CHARTS, MAPS, Etc.

At your bookstore, or mail coupon below

LIMITED EDITION ORDER NOW!

PHILOSOPHICAL LIBRARY, Publishers

The Philosophical Library, Dept. 35,
15 East 40th St., New York 16, N. Y.

Please send me ..... copies of SCIENCE SINCE 1500, at $5.00 per copy. Enclosed are $.....

NAME .....

ADDRESS .....

BOTANY

NATURE RAMBLINGS

by Frank Thone

Children's Favorites

➤ WHEN CHILDREN come running and shouting, with the first violets clutched in their eager little fists, then we know it is really spring. Violets are not the first spring flowers to open, any more than robins are the first spring birds to appear; yet somehow their cheerful faces make us feel that this time it is spring and no mistake, no mere premature warm spell, deceiving us with false hopes. There may be more psychology than phenology about it, but that's the way we all feel.

Violets have a good, well-won right to their place as the proper heralds of spring. For all their delicacy and tininess, they are a hardy and adaptable tribe, that have spread their blue-and-yellow banners to all the cool winds of the world. There are something more than 300 species of violets, ranging through all temperate lands of the world. They are found on mountain-tops and in desert valleys below sea-level; some species grow with their roots embedded in the wettest of swamp muck, others precariously clinging to rock shelves. Violets are often thought of as exclusively woodland flowers, yet some of the most beautiful and hardy of them are to be found among the wind-blown grasses of the open prairie. Blues, yellows and white are their natural colors; one species, *Viola tricolor,* combines all three, and in the hands of generations of plant breeders has become the familiar garden pansy.

There is one encouraging thing to be noted about violets, too, so far as children are concerned. They may pick all they like, so long as they do not pull the plants up bodily by the roots. Violets do depend a great deal on seed for their propagation, but relatively few of their seed are formed by the bright little flowers that children love to gather. After spring has passed, the plants produce a second crop of flowers on very short stems down among the bases of the leaves. These flowers, which most of us would mistake for buds, have no petals and never open. They fertilize themselves internally with their own pollen, and thus insure well-filled seed capsules.

Science News Letter, March 29, 1947

LANGUAGE IS POWER

...Forge ahead, win special assignments, promotion, better job in global peace time opportunities through ability to speak a foreign language.

MASTER A NEW LANGUAGE
quickly, easily, correctly by

LINGUAPHONE

The world-famous Linguaphone Conversational Method brings voices of native teachers INTO YOUR OWN HOME. You learn the new language by LISTENING. It's amazingly simple; thousands have succeeded.

HOME-STUDY COURSES IN 29 LANGUAGES

Available to Veterans under G I BILL OF RIGHTS

Send for FREE book—

LINGUAPHONE INSTITUTE
31 RCA Bldg., New York 20 • Circle 7-0830

LINGUAPHONE INSTITUTE,
31 RCA Bldg., New York 20, N. Y.
Send me the FREE Linguaphone Book.

Name.....
Address.....City.....
Language Interested.....

CHEMISTRY

Fermentation from Straw Makes Useful Chemicals

➤ INDUSTRIAL SOLVENTS, fatty acids and other useful chemicals are prepared from straw by fermentation with soil bacteria through the process on which a London inventor, Charles Weizmann, has obtained patent 2,417,801. He has found that if the bacteria are "encouraged" with easily fermentable carbohydrates, such as the starch remaining in bran, or the hexoses obtained by the partial hydrolysis of the celluloses in straw, they will act on the remaining undigested cellulosic substances, with profitable results.

Science News Letter, March 29, 1947

CHEMISTRY

Pulverized Silica Gives Luster to Varnishes

➤ DESIRED LUSTER of varnishes and lacquers can be obtained with the use of a new very highly pulverized silica revealed by the Monsanto Chemical Company. The material is so fine that there are 500,000,000,000 particles in a cubic inch, it is claimed.

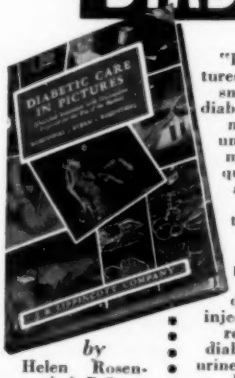
The improved material, known as Santocel, is technically a gloss reducing agent. The individual particles in the varnish or lacquer finish project through the surface and kill the gloss by scattering the reflected light. Not enough roughness is added, however, to affect the feel of the surface.

The silica particles are porous and sponge-like and contain 94% air, it is estimated. They are nearly uniform in size. The new product is made from an older Santocel that contained about 500,000,000 particles per cubic inch, and is made by bombarding the particles against each other with highly specialized equipment.

Science News Letter, March 29, 1947

to smooth the way for

DIABETICS



"Diabetic Care in Pictures" was designed to smooth the way so that diabetes and its treatment might be completely understood. The result of more than 25 years of questioning in a nationally-known clinic—and the *tested* answer to all those questions. Simply written and lavishly illustrated by charts, photographs and drawings, it tells about the diet, measurement and injection of insulin, insulin reactions, acidosis and diabetic coma, blood and urine tests and necessary body care. The coupon below will bring a copy immediately.

by Helen Rosenthal, B.S., Frances Stern, M.A. and Joseph Rosenthal, M. D.

$2.00

DIABETIC CARE IN PICTURES

150 PAGES—137 ORIGINAL ILLUSTRATIONS

J. B. LIPPINCOTT COMPANY
East Washington Square, Philadelphia 5, Pa.

I enclose $2.00. Please send me "Diabetic Care in Pictures."

NAME.....

STREET.....

CITY, ZONE, STATE.....

SNL (10 day return privilege guarantee)

Books of the Week

TO SERVE YOU: To get these books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C.

ADDENDA TO THE NATURALIST'S LEXICON—Robert S. Woods—*Abbey Garden Press,* 47 p., paper, 25 cents. A condensed but comprehensive English-Classical key to descriptive nouns, adjectives and verbs used in the NATURALIST'S LEXICON (1944) arranged under 40 general headings.

ADVANCES IN GENETICS, Vol. I—M. Demerec, ed.—*Academic Press,* 458 p., illus., $7.50. A newcomer to the Annual Review series, for the field of genetics. Whether it will be published annually or as time, paper quotas and the like permit is not indicated.

BIOCHEMISTRY OF CANCER—Jesse P. Greenstein—*Academic Press,* 359 p., illus., $7.80. Studies in one field of cancer research which have yielded results of interest and significance are presented by the Head Biochemist of the National Cancer Institute.

CANCER CAN BE CURED—Alfred J. Cantor—*Didier,* 175 p., $2.50. Simple statements of the facts concerning cancer and a guide to early recognition of symptoms.

THE CHEMISTRY OF COMMERCIAL PLASTICS—Reginald L. Wakeman—*Reinhold,* 836 p., illus., $10. This textbook correlates scientific information with actual industrial practice. Literature references after each chapter suggest primary sources for additional reading.

CLINICAL PSYCHOLOGY OF CHILDREN'S BEHAVIOR PROBLEMS—C. M. Louttit—*Harper,* rev., 661 p., $4.50. A careful study of specific behavior problems included in a general discussion of the nature of problem behavior, its diagnosis, and treatment.

THE COOPERAGE HANDBOOK—Fred Putnam Hankerson—*Chemical Pub.,* 182 p., illus., $3.75. Giving all necessary information on the manufacture of barrels, their handling and storage, together with expert specifications and Interstate Commerce Commission regulations, this book on an age-old industry will guide shippers in the choice of satisfactory containers.

ESSENTIALS OF ENDOCRINOLOGY—Arthur Grollman—*Lippincott,* 2nd ed., 644 p., illus., $10. Completely revised, this survey covers the scope, history and methods of endocrinology, including the origin, nature and clinical uses of the hormones.

FEEDS OF THE WORLD; Their Digestibility and Composition—Burch H. Schneider—*Agr. Expt. Station West Va. Univ.,* 300 p., $3. Tabulations of all available data on feeds, their composition and nutritive value for cattle, sheep, goats, swine and horses have been painstakingly assembled. An exhaustive author bibliography, feed bibliography and dictionary of common and scientific names make this book a valuable information source.

FOSSIL VERTEBRATES FROM WESTERN NORTH AMERICA AND MEXICO—E. L. Furlong, E. R. Hall, L. R. David, R. E. Wallace, H. Howard—*Carnegie Inst.,* Publ. No. 551, 195 p., illus., paper, $2.50, cloth, $3. A series of papers deals with the Pleistocene antelope and birds, Pliocene badger, Upper Eocene fish scales, Upper Cretaceous fish and Miocene mammalian fauna.

INTERNATIONAL CONTROL OF ATOMIC ENERGY; The First Report of the United Nations Atomic Energy Commission to the Security Council, U. S. Dept. of State Publ. 2737, *Govt. Printing Office,* 100 p., paper, 25 cents. This report contains the basic principles first enunciated and consistently advocated by Bernard Baruch.

THE ISLAND WAR; The United States Marine Corps in the Pacific—Frank O. Hough—*Lippincott,* 412 p., illus., $5. Officially assigned to write this history, Major Hough, U. S. M. C., was granted access to confidential documents. The result is a brilliant discussion of the struggle for successive advanced bases, the men who performed the impossible, Japanese tactics, weaknesses, and battle conduct.

LIFE HISTORIES OF NORTH AMERICAN JAYS, CROWS, AND TITMICE; Order Passeriformes—Arthur Cleveland Bent—*Govt. Printing Office,* U. S. Natl. Museum Bul. 191, 495 p., illus., paper, $1.75. As full a life history as possible is given of the best-known subspecies of each species, with brief mention of the others. Egg dates and measurements and distribution and migration habits are included.

THE MAMMALS OF VIRGINIA—John Wendell Bailey—*pub. by the author,* 413 p., illus., $5. A full account of every kind of wild and domestic mammal known to have lived in Virginia, plus a list of fossil forms found in that state. The book is well indexed and has an excellent bibliography.

MATHEMATICAL RECREATIONS AND ESSAYS—W. W. Rouse Ball, rev. H. S. M. Coxeter—*Macmillan,* 11th ed., 418 p., illus., $2.95. This first American edition of a classic will continue to divert amateurs of mathematics with its problems about ferry boats, school girls, cryptograms, and various arithmetical aand geometrical fallacies.

MEMOIRS OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY; The Prehistory of Northern North America As Seen From the Yukon, Sup. to American Antiquity, Vol. XII, No. 3, Part 2—Frederica de Laguna—*Soc. for Am. Arch.,* 360 p., illus., paper, $3.50. This statement of the results of an expedition to the Tanana and Yukon valleys also attempts to relate its discoveries to previous work in the region by explorers and archaeologists.

THE NATURE AND PREVENTION OF THE CEREAL RUSTS AS EXEMPLIFIED IN THE LEAF RUST OF WHEAT—K. Starr Chester—*Chronica Botanica,* 269 p., $5. An account of the progress thus far made in the development of rust-resistant wheat serves as an aid for future efforts at solution of this continuing problem.

PHOTOELECTRIC CELLS—A. Sommers—*Chemical Pub.,* 104 p., $2.75. Stresses the points to be considered in selecting the most suitable photoelectric cells for a specific purpose and discusses the advantages of one type over the others.

PHYSICAL MEDICINE IN GENERAL PRACTISE Arthur L. Watkins, ed.—*Lippincott,* 341 p., illus., $5. The increasing interest in physical medicine makes this book especially timely. General practitioners particularly will welcome it.

PLANE TRIGONOMETRY—William Kelso Morrill—*Rinehart,* rev. ed., 245 p., $2.50. A textbook designed to make the student think, it includes problems in elementary physics, engineering, and navigation to illustrate the practical application of this branch of mathematics. Because it is more widely used to solve problems involving the right triangle than any other way, this is treated thoroughly.

ROCKETS AND SPACE TRAVEL; The Future of Flight Beyond the Stratosphere—Willy Ley—*Viking,* 374 p., illus., $3.75. A scientific record of efforts made in the field of interplanetary travel is detailed here, together with modern advances in rocket propulsion which begin to advance this idea to a stage of practical experiment.

THE SCIENCE DIGEST READER, *Windsor Press,* 310 p., $3. Oustanding articles published in *Science Digest* during the past ten years are collected in this volume.

SEMIMICRO EXPERIMENTS IN GENERAL CHEMISTRY—Jacob Cornog—Ginn, 217 p., illus., $2.50. This college text applies the time, space, and money saving advantages of the semimicro method to first year general chemistry.

UTILIZING HUMAN TALENT—Frederick B. Davis—*Am. Council on Ed.,* 85 p., paper, $1.25. This report of the Commission on Implications of Armed Services Educational Programs is an evaluation of the Armed Services aptitude testing, guidance and counciling programs with relation to admission and selection policies and practices in schools and colleges.

THE YEARBOOK OF PSYCHOANALYSIS, Vol. II—Sandor Lorand, ed.—*Int. Univs. Press,* 280 p., $7.50. Collection of contributions to psychoanalytic theory and practise and to applied psychoanalysis that appeared during 1946 in various foreign and domestic publications.

Science News Letter, March 29, 1947

YOUR

HAIR

AND ITS CARE

By Oscar L. Levin, M.D.
and Howard T. Behrman, M.D.

NEW, REVISED, EXPANDED EDITION—JUST OUT!

If you want healthy hair, lovely hair, then you need the expert advice in this book.

Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair. They tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as:

Dandruff—gray hair—thinning hair—care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene, etc., etc.

Medical science is better equipped than ever before, to prevent hair trouble; or, if it already exists, to deal effectively with it.

"A worthwhile book full of important information."
—Ohio State Medical Journal.

Price $2.00, incl. postage, 5-day-Money-Back Guarantee

EMERSON BOOKS, Inc., Dept. 804, 251 W. 19th Street, New York 11

• New Machines and Gadgets •

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C., and ask for Gadget Bulletin 355. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

DOUBLE-UNIT light stand for photographers has a sturdy cross-beam rod that holds a light and a reflector at each end. Made in two sections, it can be extended to a height of 10.5, feet, and telescoped for easy carrying to 3.5 feet.

Science News Letter, March 29, 1947

PHONOGRAPH NEEDLE, boot-shaped, molded of nylon, has a jewel tip to follow the groove in the record. The elasticity of the nylon protects the stylus, keeping it always in line with the shank and preventing it from jumping out of the groove.

Science News Letter, March 29, 1947

GAS ANALYZER, which makes use of infra-red or heat rays, can detect one part of carbon monoxide or carbon dioxide in 50,000 parts of air. It can make a continuous, automatic analysis of any gas capable of absorbing infra-red rays and measure its concentration in a mixture.

Science News Letter, March 29, 1947

BUTTER CHURN for home use has an aluminum dasher operated by a tiny electric motor in a housing that fits on the top of a glass jar. It makes butter in 15 minutes. Its dasher is detachable and is easily cleaned.

Science News Letter, March 29, 1947

GLASSES for persons who have had cataract operations are available in a lightweight form which has the corrective part in the center of the lens. This

is large enough to cut out the ultraviolet rays normally absorbed by the lens of the eye. The picture shows the new glasses on the lady as contrasted with the old type on the man.

Science News Letter, March 29, 1947

BOTTLE CARRIER, for use in handling bottles of acids or other chemicals in laboratories or factories, is made of heavy duck, impregnated on both sides with chemical-resistant synthetic rubber. Carrying straps of double thickness run completely under the load.

Science News Letter, March 29, 1947

JAR CAP REMOVER for household use in loosening the tops of glass fruit containers is a wall fixture with a hand crank and a chain of links to pass around the edge of the cap. A turn of the crank tightens the links, causing them to grasp the cap firmly and revolve it.

Science News Letter, March 29, 1947

PHOTOGRAPHIC analyzer enables an amateur photographer to make good prints, because it accurately appraises the value of a negative as to density and contrast range. It determines definitely correct printing exposures and controls many other processes.

Science News Letter, March 29, 1947

BOOKS

SCIENCE NEWS LETTER will gladly obtain any American book in print for subscribers.

Send check or money order to cover regular retail price. If price is unknown, send $5 and change will be returned. We will pay postage in the United States.

Book Department

SCIENCE NEWS LETTER
1719 N Street, N.W.
Washington 6, D.C.

Question Box

AERONAUTICS

What is unusual about the flying wing YB-49? p. 194.

What kind of stations will open the Great Circle route in bad weather? p. 197.

ASTRONOMY

What is the brightest planet in April skies? p. 202.

BOTANY

Why can children pick all the violets they want without interfering with propagation of the species? p. 206.

ENGINEERING

What are the five major sources of synthetic fuels? p. 198.

NUTRITION

Has Europe had much post-war vitamin deficiency disease? p. 195.

PHOTOGRAPHY

How did the OSS secretly take and develop pictures during the war? p. 195.

PSYCHOLOGY

What narrows "brain maps?" p. 199.

PHYSICS

What fissionable materials in your home will be scarce? p. 194.

PLANT PHYSIOLOGY

How does 2,4-D kill plants? p. 200.

VETERINARY MEDICINE

Why must the carcasses of diseased livestock be buried so deeply? p. 196.

Where published sources are used they are cited.

The imprint to the right is mailing address for your Science News Letter.

Date on lower line is expiration of your subscription.

Renew early to avoid lapse in service.

In requesting change of address please give your old address as well as the new one, at least two weeks before change is to become effective.

DETROIT PUBLIC LIBRARY
SCIENCE & INDUSTRY DEPARTMENT
5201 WOODWARD AVE.
DETROIT 2, MICH.